# URBAN AND REGIONAL LAND USE ANALYSIS: CARETS AND CENSUS CITIES EXPERIMENT PACKAGE

SKYLAB/EREP INVESTIGATION NO. 469
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MONTHLY PROGRESS REPORT
JANUARY through MARCH 1974

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a. Overall status, including problem areas and significant progress to date:

a.1. CARETS -- Land use analysis: The CARETS land use analysis effort is just getting underway during the period of this report, with the selection of areas for which suitable imagery is available for first-priority, more detailed analysis. Two areas have been selected: the Washington-Baltimore area and the Atlantic and Chesapeake Bay coastal areas of the southern Delmarva Peninsula. Several possible mapping formats are being considered, along with a spatial sampling strategy for selective comparison of the Skylab-derived land use measurements with those of ERTS, aircraft, and ground data. This work plan is being coordinated with the portion of the CARETS-ERTS experiment which calls for the digitizing and subsequent computer processing of land use "polygons" as identified and mapped from the Skylab imagery. Since the ERTS work to date in map digitizing has been done in a portion of the test site which, unfortunately, was not covered by Skylab (the Norfolk-Portsmouth Standard Metropolitan Statistical Area), data for comparison with Skylab is not yet available in quantitative form. Delays in sub-contracts and equipment procurement have thus affected the ERTS and Skylab CARETS experiments.

a.2. CARETS -- Land use climatology: During the period of this report the final ground measurements in support of the land use climatology experiment were taken at the time of the EREP pass on January 31, 1974 at 10:31 a.m. local time Baltimore. Two previous attempts were made in January, and three in December, but all were scrubbed either because of weather or because of crew schedule changes. Field data from the January 31 measurements are summarized below:

Site: Tridelphia Reservoir, Maryland
water depth: 55 ft.
water very turbid
albedo of water: 0.1 mv

| Time EDT | Water Surface Temp. °C | Solar Radiation (mv) | Air Temp. °F. |
|---|---|---|---|
| 10:15 | +5 | | |
| 10:20 | 5 | 0.7 | 48 |
| 10:25 | 5 | 0.6 | 48 |
| 10:30 | 5 | 0.6 | 47 |
| 10:35 | 5 | 0.7 | 47 |
| 10:40 | 5 | 0.6 | 47 |
| 10:45 | 5 | 0.6 | 47 |

Data from the thermal channel of the S-192 scanner is of crucial importance to this portion of the experiment. Screening film from Skylab 2 received thus far is not acceptable, either because of lack of contrast in the print we received, or because of excessive noise in the system. The NASA Principal Investigators Management Office has been so informed. Before proceeding with the analysis phase of this part of the project, we need to know whether: (1) the Skylab 2 data can be improved by enhancement techniques at NASA to the degree where they can serve satisfactorily as input to the surface climate simulation model we are employing; (2) Skylab 3 or 4 data for Baltimore can be satisfactorily processed to serve the same purposes (particularly data obtained after change of the detector in the Skylab 4 mission; or (3) in the event that no satisfactory thermal data for the Baltimore site are obtained from any mission, thermal data taken over another test site could be substituted. If neither (1) nor (2) prove to be viable,we will have to confer with all the investigators involved in the land use climatology portion of this investigation before deciding whether option (3) is workable. Also, if NASA is unable to supply processed S-192 data in a form suitable for the land use climatology experiment, it is almost certain that this investigation's budget will not cover additional data processing costs if we have to undertake extensive additional computer processing before the data can be input into the model. Therefore, an early conference between NASA and USGS staff on the S-192 problem seems called for.

On March 11, 1974, this investigation provided ground data in support of the Environmental Research Institute of Michigan (ERIM)/Skylab investigation (Fred Thomson, investigator). The data provided to ERIM was in the form of aircraft-derived land use maps, land use change maps, and cultural features overlay, for the following four sheets in the CARETS map series:

Sheet No. 9 -- Westminster
10 -- Baltimore
17 -- Washington
18 -- Annapolis

It is our understanding that these data are to be used in support of further research on the usefulness of the Skylab sensors, including the S-192 scanner. If it seems likely that the ERIM project might result in better tapes from the scanner data, further cooperation in the form of provision of those tapes in a form readable on USGS equipment might well help to solve some of the problems outlined above. We have, of course, also been cooperating with ERIM through their collection and processing of aircraft data obtained for the USGS Skylab-preparatory mission (55M) flown over Baltimore in 1972. A draft of the ERIM report on that mission has been received and is being reviewed by us.

a.3. Census Cities: Since the last reporting period, the Census Cities portion of the Skylab investigation has received 9 x9 inch enlargements of SL-2 190B imagery for the Peoria test site. SL-3 earth terrain camera coverage in 5 x 5 inch format has been received for Phoenix, New Orleans, Pontiac, Aurora, New Haven, Denver, Salt Lake City, San Francisco, and Pittsburgh. Multispectral camera coverage in 70 mm format from the SL-3 mission has also been received for the Phoenix and San Francisco test sites.

Much of the work during this reporting period has involved identification and classification of Skylab imagery and quick-look appraisals of image quality. We find the overall quality to be very good and we are especially optimistic about the usefulness of the earth terrain camera coverage for metropolitan land use analysis.

Color print enlargements at 1:100,000 scale from S-190B imagery are being ordered for all test sites for which this coverage has been received. In addition, false color infrared prints and transparencies are being processed from the appropriate S-190A black-and-white transparencies in the different spectral bands for selected test sites. The color enlargements and color IR images will be used to facilitate data analysis.

b. Recommendations concerning decision and/or actions required to ensure the attainment of the experiment's scientific objectives:

It is recommended that the matter of provision of S-192 data for the land use climatology part of this experiment be the subject of an early conference among NASA and USGS project staff, as indicated in the discussion of problems, Section a.2., above.

c. Expected accomplishments during the next report periods:

(1) complete paper on evaluation of Skylab data (Phoenix prime example) for metropolitan planning.

(2) prepare for user evaluation of Skylab data from CARETS area.

(3) put finishing touches on optical integrating technique for deriving net radiation maps from thermal imagery, as back-up technique for processing of data from S-192 scanner.

(4) continue land use analysis of urban area S-190A and B imagery.

d. Significant results and their relationship to practical applications or operational problems:

During this reporting period, work continued on the analysis of SL-2 and SL-3 190A and 190B imagery for the Phoenix test site. Land use interpretation and change detection analysis were performed using 1:100,000 photographic enlargements of a portion of the Skylab image. Comparisons were made between the 1973 Skylab imagery, 1972 ERTS imagery, and the 1970 and 1972 land use data base derived from high-altitude aircraft photography for a portion of the Phoenix area to compare and contrast sensor/platform capabilities for land use mapping and change detection.

When all the findings are in, it is expected that these results will aid in selection of sensor-platform combinations that will best serve the needs of land use data users in metropolitan regions.

e. Summary outlook for the remaining effort to be performed:

Optimism previously expressed concerning the value of Skylab photographic data for fulfilling the objectives of this experiment still prevails. The use of the S-192 scanner data in the land use climatology portion of the experiment is still clouded by some uncertainties, as explained in Section a.2 above.

f. Travel summary and plans:

Valerie Milazzo will present an invited paper on the use of Skylab imagery in detecting urban growth at the annual meeting of the American Geophysical Union in Washington, D.C. on April 8. Milazzo will also present a paper entitled "Some findings on the Applications of ERTS and Skylab imagery for metropolitan land use analysis" at the Ninth International Symposium on Remote Sensing of Environment to be held in Ann Arbor, Michigan in April.

Approved:

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